Claims

[c1] A data transmitter, comprising:
an adaptive finite impulse response (FIR) driver having a plurality of taps to which coefficients having updateable values are applied, said FIR driver having a transfer function between an input stream of data bits and an output stream of data bits such that each data bit output from said FIR driver has an amplitude adjusted as a function of the values of a plurality of the data bits of the input stream, and the values of the coefficients; and
rewriteable non-volatile storage, operable to be rewritten with control information representing the values of the coefficients updated during operation of said FIR driver, such that said updated values are applied to said taps from the control information stored in said rewriteable non-volatile storage.

[c2] The data transmitter of claim 1 wherein said rewriteable storage is operable to be rewritten with the control information in response to updating the values of the coefficients.

[c3] The data transmitter of claim 1 wherein the coefficients are applied to the taps of said FIR driver as currents hav-

ing magnitudes adjustable in relation to the control information.

[c4] The data transmitter of claim 1 wherein the output stream of data bits is a serial stream and said FIR driver outputs the output stream of data bits as differential signals.

[c5] The data transmitter of claim 1 wherein said rewriteable non-volatile storage includes a non-volatile random access memory (NVRAM) selected from the group consisting of flash memory, metal-oxide-nitride-oxide-silicon (MONOS) memory, Chalcognide RAM and MRAM.

[c6] The data transmitter of claim 5 wherein said NVRAM is provided as an embedded element on an integrated circuit chip on which said FIR driver is provided.

[c7] The data transmitter of claim 5 wherein said NVRAM is provided on a first integrated circuit chip of a package containing a second integrated circuit chip on which said FIR driver is provided.

[c8] The data transmitter of claim 1 further comprising a register operable to receive and hold the control information from the control information stored in said rewriteable non-volatile storage.

[c9] The data transmitter of claim 8 wherein said FIR driver includes a current steering unit operable in response to the control information stored in said register to produce the currents having adjustable magnitudes.

[c10] The data transmitter of claim 1 further comprising a termination network adapted to terminate conductors coupled to carry the output stream of data bits, the termination network including a plurality of independently selectable terminating impedances, the terminating impedances being selectable in response to termination selection input, the termination selection input being subject to modification during operation of said data transmitter.

[c11] The data transmitter of claim 10 wherein said rewriteable non-volatile storage is operable to be rewritten with the termination selection input.

[c12] The data transmitter of claim 1 further comprising an impedance matching network operable to match an impedance of conductors coupled to carry the output stream of data bits, said impedance matching network including a plurality of independently selectable impedance elements including independently selectable reactance elements, the impedance elements being selectable in response to selection input, the selection in-

put subject to modification during operation of said data transmitter.

[c13] The data transmitter of claim 12 wherein said reactance elements include inductors and capacitors.

[c14] The data transmitter of claim 12 wherein said rewriteable non-volatile storage is operable to rewriteably store the selection input.

[c15] The data transmitter of claim 1 further comprising a power adjustment unit, said power adjustment unit being responsive to selection input retrieved from said rewriteable non-volatile storage to adjust a power level of said data transmitter.

[c16] A method of transmitting a stream of data bit signals each having an amplitude adjusted in relation to the values of the data bits being transmitted, comprising:
applying an input stream of data bits to an input of an adaptive finite impulse response (FIR) driver, said FIR driver including a plurality of taps to which coefficients having updateable values are applied;
driving data bit signals by said FIR driver at amplitudes determined as a function of the values of a plurality of the data bits input to said FIR driver and the values of the coefficients;

updating values of the coefficients applied to said taps during operation of said FIR driver;
storing control information representing the updated values of the coefficients in a rewriteable non-volatile storage; and
retrieving the control information from said storage for applying the updated values of the coefficients to said taps upon powering up said FIR driver.

[c17] The method of claim 16 wherein the control information includes a plurality of current steering control bits, said method further comprising applying the current steering control bits to a current steering unit to provide a plurality of currents having adjustable magnitudes to the taps of said FIR driver, and driving the data bits output by said FIR driver at amplitudes at least partly determined by the magnitudes of the currents.

[c18] The method of claim 17 further comprising storing the current steering control bits to a register from the current steering control bits stored in said rewriteable non-volatile storage, and storing the current steering control bits to said current steering unit from the current steering control bits stored in said register.

[c19] The method of claim 16 wherein said rewriteable non-volatile storage includes a non-volatile random access

memory (NVRAM) selected from the group consisting of flash memory, metal-oxide-nitride-oxide-silicon (MONOS) memory, Chalcognide RAM and MRAM.

[c20] The method of claim 19 wherein said NVRAM is provided as an element selected from the group consisting of a) an embedded NVRAM in an integrated circuit chip on which said FIR driver is provided, and b) an element of a first integrated circuit chip of a package containing a second integrated circuit chip on which said FIR driver is provided.

[c21] The method of claim 16 further comprising storing control information representing the coefficients to a register from the control information stored in the rewriteable non-volatile storage and generating currents representing the coefficients from the control information stored in the register.

[c22] The method of claim 16 further comprising driving the data bit signals by said FIR driver serially as a pair of differential signals.

[c23] The method of claim 16 wherein the data bits of the input stream are input to said FIR driver as a plurality of pairs of differential signals.

[c24] The method of claim 16 further comprising providing a

termination network coupled to conductors coupled to carry the output of said FIR driver, the termination network including a plurality of independently selectable impedances, storing termination control information in said rewriteable non-volatile storage, and storing the termination control information to a register from the termination control information stored in said rewriteable non-volatile storage, to terminate the conductors by selecting ones of the independently selectable impedances according to the termination control information stored in said register.

[c25] The method of claim 16 further comprising providing an impedance matching network coupled to conductors coupled to carry the output of said FIR driver, the impedance matching network including a plurality of independently selectable impedance elements including reactance elements, storing impedance matching control information in said rewriteable non-volatile storage, and storing the impedance matching control information to a register from the impedance matching control information stored in said rewriteable non-volatile storage, to match an impedance of a network including said conductors by selecting ones of the independently selectable impedance elements according to the impedance matching control information stored in said

register.

[c26] A method of transmitting a serial stream of data bit signals each having an amplitude adjusted in relation to the values of the data bits being transmitted, comprising:
applying an input stream of data bits to an input of an adaptive finite impulse response (FIR) driver having a plurality of taps to which coefficients having updated values are applied;
driving data bit signals by said FIR driver at amplitudes determined as a function of the values of a plurality of the data bits input to said FIR driver and the values of the coefficients;
updating values of the coefficients applied to said taps during operation of said FIR driver;
storing control information representing the updated values of the coefficients in a rewriteable non-volatile storage; and
retrieving the updated values from said storage for applying said coefficients to said taps upon powering up said FIR driver.

[c27] The method of claim 26 wherein said rewriteable non-volatile storage includes a non-volatile random access memory (NVRAM) selected from the group consisting of flash memory, metal-oxide-nitride-oxide-silicon (MONOS) memory, Chalcognide RAM and MRAM.

[c28] The method of claim 27 wherein said NVRAM is provided as an element selected from the group consisting of a) an embedded NVRAM in an integrated circuit chip on which said FIR driver is provided, and b) as an element of a first integrated circuit chip of a package containing a second integrated circuit chip on which said FIR driver is provided.

[c29] The method of claim 26 further comprising providing a termination network coupled to conductors coupled to carry the output of said FIR driver, the termination network including a plurality of independently selectable impedances, storing termination control information in said rewriteable non-volatile storage, and storing the termination control information to a register from the termination control information stored in said rewriteable non-volatile storage, to terminate the conductors by selecting ones of the independently selectable impedances according to the termination control information stored in said register.

[c30] The method of claim 26 further comprising providing an impedance matching network coupled to conductors coupled to carry the output of said FIR driver, the impedance matching network including a plurality of independently selectable impedance elements including

reactance elements, storing impedance matching control information in said rewriteable non-volatile storage, and storing the impedance matching control information to a register from the impedance matching control information stored in said rewriteable non-volatile storage, to match an impedance of a network including said conductors by selecting ones of the independently selectable impedance elements according to the impedance matching control information stored in said register.